

DTC-Pro DOUBLE-TEE CONNECTION

U.S. PATENT NO. US8468766 B1



GUIDE SPECIFICATION
05 50 10 - METAL FABRICATIONS

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NOTE TO SPECIFIER: NOTES TO SPECIFIER ARE DESIGNATED BY []. SPECIFIER IS TO SELECT OPTIONS AS APPLICABLE.

Part 1 - GENERAL CONDITIONS

1.01 DESCRIPTION

- A. Installation of welded Double-Tee Connection erection bar for shear and alignment of connections between precast concrete elements.

1.02 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Conditions and other Division 1 Specifications Sections, apply to the Work of this Section.

1.03 QUALITY ASSURANCE

- A. Examine Drawings and Specifications prior to bidding or executing work. Notify the Engineer of Record (EOR) immediately should omissions or errors be discovered.
- B. Perform mockups for Double-Tee Connection installation. Upon approval, mock-ups may be incorporated into construction. Mockups shall be accepted prior to further installation begins.

1.04 SPECIAL INSPECTIONS

[NOTE TO SPECIFIER: EOR TO DETERMINE SPECIFIC INSPECTION AND SPECIAL INSPECTION REQUIREMENTS. THE FOLLOWING IS A GUIDE FOR REFERENCE]

- A. Special Inspector: This project is subject to the requirements of Special Inspections. The Owner will engage the services of a qualified Special Inspector for this project. The Special Inspector will confirm that the provisions of Chapter 17, Special Inspections and Tests, of the IBC are complied with and will provide and/or supervise inspection and testing requirements, as necessary.
 - 1. The engineer will perform his duties, insofar as possible, in such a way that neither fabrication nor erection is unnecessarily delayed or impeded.
- B. Field inspection includes but is not limited to examination of erected steel for welding, proper fitting, alignment, trueness and plumbness:
- C. Welded Connections: Field welding connections will be inspected and tested during erection of precast concrete elements as follows

1. Verify welder certification and conduct inspection and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. The inspection agency will test field welds as follows:
 - a. All welds: [XXX]% visual, [XXX]% witness **[EOR TO DETERMINE REQUIREMENTS]**
3. Welds will be visually inspected according to AWS D1.1/D1.6. In addition to visual inspection, welds will be tested according to AWS D1.1/D1.6 and the following inspection procedures, at testing agency's option based upon conditions:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
4. For weld tests, reports by the Agency inspector will contain, as a minimum, an adequate description of each weld tested, the identifying mark of the welder responsible for the weld, a critique of statement regarding the acceptability of the weld tested, as judged by current AWS Standards.

1.05 SUBMITTALS

- A. Samples of each primary component to be used in the Double-Tee Connection and the manufacturer's current product data sheet for each component.
- B. Shop Drawings: Submit shop drawings including complete details and schedules for fabrication and assembly of structural members, procedures and diagrams.
 1. Include details of cuts, connections, holes, and other pertinent data.
 2. Provide setting drawings, templates, and directions for installation of connections and anchorages. Include embedment drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
- C. Submit Certificate of Compliance for the following, including data to show compliance with specified requirements:
 1. Double-Tee Connection erection bar material.
 2. Welding filler material.

- D. Welding Certificates: Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 12 months and are qualified for the proposed work.
- E. Welding Procedure Specifications: Provide Welding Procedure Specifications (WPS) prepared in accordance with Section 1704.3.1, Table 1704.3 and Section 1708 of the IBC. WPS shall be developed by the welding contractor for the welded joints between structural steel elements for each welding position, welding process, electrode manufacturer, filler metal trade name for the electrode type selected, and for all essential variable changes in the procedure qualification record (PQR) that exceed allowable tolerances. Each WPS shall be qualified by a documented PQR in accordance with Section 4 of AWS D1.1.

1.06 REFERENCE STANDARDS

- A. References in these specifications to standards, test methods, codes etc., are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.
 - 1. **[NOTE: INSERT APPLICABLE CODE FOR JURISDICTION]**
 - 2. American Institute of Steel Construction (AISC):
 - a. Code of Standard Practice for Steel Buildings and Bridges
 - b. Specifications for Structural Steel Buildings
 - c. Design Guide 27 Structural Stainless Steel
 - 3. American Society of Testing and Materials (ASTM):
 - a. ASTM A167 "Standard Specification for Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip", 2004.
 - 4. American Welding Society (AWS):
 - a. Structural Welding Code - D1.1
 - b. Stainless Steel Welding Code - D1.6

1.07 DELIVERY STORAGE AND HANDLING

- A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

- B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
- C. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers and read product Safety Data Sheets (SDS).
- D. Any materials which are determined to be damaged are to be removed from the job site and replaced.
- E. Safety Data Sheets (SDS) shall always be available for each product at the job site.

Part 2 - MATERIALS

2.01 GENERAL

- A. Erection bar (Jumper plate) shall be DTC – Pro Double-Tee Connection manufactured by NORTHFORD STRUCTURAL CONNECTIONS LLC (NSC) of New Haven, Connecticut. (203/777-0751) – U.S. Patent No.US8468766 B1.
- B. Components that are other than those supplied or manufactured by NSC shall be submitted for review and acceptance by the Engineer of Record (EOR).

[NSC RECOMMENDATIONS FOR PRODUCTS NOT SUPPLIED OR MANUFACTURED BY NSC ARE FOR THE CONVENIENCE OF THE SPECIFIER; THE EOR SHALL VERIFY SUITABILITY OF THE CONNECTION AND THE COMPONENTS FOR THE JOB SPECIFIC APPLICATION. THE SPECIFICATIONS, INSTALLATION INSTRUCTIONS, LIMITATIONS, AND RESTRICTIONS OF THE RESPECTIVE MANUFACTURER'S PRODUCTS MUST BE REVIEWED BY THE EOR FOR ACCEPTABILITY FOR THE INTENDED USE WITH NSC PRODUCTS.]

2.02 MATERIALS

- A. DTC-Pro Double-Tee Connection shall be an erection bar designed to enhance performance of modern precast concrete embedments by increasing both strength and fatigue resistance to out of plane loading by improving weld geometry to increase elastic and plastic section modulus of the welds.
 - 1. Stainless Steel: Type 304, ASTM A167 with a minimum Tensile Strength (F_u) of 70 KSI, a minimum Yield Strength (F_y) of 30 KSI, and a modulus of Elasticity (E) of 28,000 KSI.
 - 2. DTC-Pro shall be supplied in varying widths in 1/8" increments to match varying joint widths.
 - a. Markings shall be provided indicating weld lengths of 1¼" (2½" total each side).
 - b. DTC-Pro profile/shape shall provide the following section properties for out of plane loading:

$$S_{x+} / S_{x-} = 0.081 \text{ in}^3 / 0.081 \text{ in}^3$$

$$Z_{x+} / Z_{x-} = 0.152 \text{ in}^3 / 0.152 \text{ in}^3$$

3. Electrodes for Welding: Comply with AWS Code
 - a. AWS Class E70XX Series Electrodes shall be used for all welding of structural steel
 - b. For welding stainless steel to stainless steel, use E308L covered welding electrode

Part 3 - EXECUTION

3.01 GENERAL

- A. The Contractor, Owner's Representative, and Engineer of Record (EOR) shall attend a pre-construction conference.
- B. Mockup installation shall be performed prior to or during the preconstruction conference for review.

3.02 SUBSTRATE CONDITION

- A. Contractor shall be responsible for acceptance or provision of proper substrate to receive DTC-Pro Double-Tee Connection. The substrate shall be clean, smooth, dry, free of water, ice, loose and foreign material, oil, grease and other contaminants. Do not begin work until deleterious conditions have been corrected.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

[NOTE TO SPECIFIER: COORDINATE REQUIREMENTS WITH MANUFACTURED EMBEDMENT ANCHORS. THE DTC-Pro HAS BEEN DESIGNED TO FIT WITH MODERN STEEL CONNECTIONS EMBEDMENTS WITH A 6° SLOPING FACE AND REGULAR JOINT WIDTHS. IF CONDITIONS WARRANT, CONTACT NSC FOR CUSTOM SHAPES AND WIDTHS]

3.03 DTC-Pro LAYOUT AND LOCATION REQUIREMENTS

- A. DTC-Pro shall be placed at elevation required to place welds within acceptable weld zones on face of anchorage embedment.
- B. Choose proper DTC-Pro width that allows welds to be performed at proper elevation while also providing tightest fit. Hold DTC-Pro at proper elevation until welded both sides.
- C. Gap at root of weld between DTC-Pro and embedment shall not exceed AWS D1.1/D1.6 requirements for root opening.

3.04 DTC-Pro INSTALLATION - GENERAL

- A. Level deck joint prior to installing DTC-Pro; clamp joint to level and hold until all DTC-Pro erection bars are installed along the joint prior to releasing clamps.

- B. Standard DTC-Pro is designed as an improved erection bar for a connection that typically receives a ¼" fillet weld, 2½" long. Should weld requirements vary from this amount, contact NSC for custom shapes and sizes.
- C. Install DTC-Pro at proper elevation and weld in place per AWS D1.1/1.6 requirements. **DO NOT OVER WELD** or OTHERWISE OVERHEAT BASE MATERIAL.
 - a. Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - b. Comply with requirements of Weld Procedure Specifications for each weld type.
- D. Remove all slag, clean to bright condition, and perform initial inspection; touch up welds as required prior to controlled inspections being performed. Remedy defective welds to satisfaction of Weld Inspector, Special Inspector, and Engineer of Record.

3.05 FIELD QUALITY CONTROL

- A. The Contractor shall furnish such facilities and provide such assistance as may be required for carrying out the inspection prescribed herein, including providing access to inspection areas.
- B. Contractor shall correct deficiencies that inspections and laboratory test reports have indicated to be not in compliance with requirements. Additional tests will be performed as may be necessary to confirm compliance of original work.

3.06 CLEAN UP

- A. Perform daily clean up and removal from the site of all empty containers, scrapings, surplus materials and other debris resulting from these operations.

End of Section 05 50 10 – Metal Fabrications

DISCLAIMER

Nothing contained in any NSC materials relieves the user of the obligation to read and follow the warnings and instruction for each manufactured product as set forth in the current Product Data Sheet, product label and Safety Data Sheet prior to product use.

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